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SEDIMENTS

Mr. Michael Berkoff
Remedial Project Manager
USEPA Region 5
77 West Jackson Boulevard (SRF-6J)
Chicago, IL 60604-3507

Subject:
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Willow Boulevard/A-Site Landfill Operable Unit 2
Remedial Design Work Plan and Supporting Documents

Date:
March 10, 2010

Contact:
Pat McGuire

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Our ref:
B0064581.0000.00670/
B0064582.0000.00670

Dear Mr. Berkoff:

On behalf of Georgia-Pacific LLC (Georgia-Pacific), please find enclosed the *Willow Boulevard/A-Site Landfill Operable Unit 2 Remedial Design Work Plan* (WB/A-Site OU RD Work Plan).

The WB/A-Site OU RD Work Plan was originally submitted to the United States Environmental Protection Agency (USEPA) in November 2009 to describe remedial design activities associated with the Consent Decree for the Design and Implementation of Certain Response Actions at Operable Unit 2 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (i.e., the WB/A-Site OU). The USEPA provided comments along with a conditional approval of the Work Plan on December 21, 2009, and this Final WB/A-Site OU RD Work Plan has been revised consistent with these comments.

Three hard copies of the Work Plan are provided, along with a CD containing a PDF version of the entire document. Additional copies are being sent as presented in the cc list below.

As part of the development of the response action at the WB/A-Site OU, several supporting documents are being submitted concurrent with this Work Plan under separate cover. These documents are: the *Multi-Area Quality Assurance Project Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site – Revision 1, Addendum 6 to the Multi-Area Health and Safety Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site – Revision 1,* and the *Multi-Area Field Sampling Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site – Addendum 3.*

We look forward to working with USEPA, the newly formed Michigan Department of Natural Resources and Environment (MDNRE), and the Natural Resource Trustees to design and implement this project.

Sincerely,

ARCADIS

Pat McGuire
Project Coordinator

Enclosures:
Michael Berkoff: 3 hard copies, each with a CD

Copies:

Chief, Environmental Enforcement Section: Letter only - document available upon request
Director, Superfund Division: Letter only - document available upon request
Nicole Wood-Chi, USEPA: Letter only - document available upon request
Leslie Kirby-Miles, USEPA: Letter only - document available upon request
Anthony Audia, USEPA: Letter only - document available upon request
Paul Bucholtz, MDNRE: 1 hard copy and 1 CD
Kristi Zakrzewski, MDNRE: 1 hard copy and 1 CD
Judith Alfano, MDNRE: Letter only - document available upon request
Sharon Hanshue, MDNRE: Letter only - document available upon request
Lisa Williams, U.S. Fish and Wildlife Service: Letter only - document available upon request
Todd Goeks, NOAA: Letter only - document available upon request
Polly Synk, Department of Attorney General: Letter only - document available upon request
Jeff Keiser, CH2M HILL: Letter only - document available upon request
Garry Griffith, P.E., Georgia-Pacific LLC: 1 hard copy and 1 CD
J. Michael Davis, Esq., Georgia-Pacific LLC: Letter only - document available upon request
Mark Brown, Waterviews, LLC: Letter only – document available upon request
Richard Gay, Weyerhaeuser Company: 1 CD
Martin Lebo, Weyerhaeuser Company: 1 CD
Kathy Huibregtse, RMT, Inc.: 1 CD
Michael Erickson, P.E., ARCADIS: 1 hard copy and 1 CD

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Willow Boulevard/A-Site Landfill Operable Unit 2

Remedial Design Work Plan

Georgia-Pacific LLC

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Operable Unit 2

Remedial Design Work Plan

Georgia-Pacific LLC

March 2010

ARCADIS

Patrick McGuire
Project Coordinator

Remedial Design Work Plan

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site

Willow Boulevard/A-Site Landfill
Operable Unit 2

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Appendices

Acronyms and Abbreviations

ASTM	American Society for Testing Materials
CD	Consent Decree
CDM	Camp Dresser & McKee, Inc.
CQAPP	Construction Quality Assurance Project Plan
ft/s	feet per second
MDEQ	Michigan Department of Environmental Quality
MDNRE	Michigan Department of Natural Resources and Environment
mg/kg	milligrams per kilogram
NOAA	National Oceanic and Atmospheric Administration
NREPA	Natural Resources and Environmental Protection Act
O&M	Operation and Maintenance
OU2	Operable Unit 2
PCBs	polychlorinated biphenyls
PSVP	Performance Standards Verification Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
RD	Remedial Design
ROD	Record of Decision
SOW	Statement of Work
SPT	Standard Penetration Testing
TCRA	Time-Critical Removal Action
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WB/A-Site OU	Willow Boulevard/A-Site Landfill Operable Unit 2

1. Introduction

This Remedial Design (RD) Work Plan presents the approaches for completing the RD for the Willow Boulevard/A-Site Landfill Operable Unit (WB/A-Site OU) located in Kalamazoo, Michigan (Figure 1). The WB/A-Site OU is Operable Unit 2 (OU2) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site or Superfund Site), located in Kalamazoo and Allegan Counties, Michigan. On September 30, 2009 a Consent Decree for the Design and Implementation of Certain Response Actions at Operable Unit 2 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (CD; Civil Action 1-09-cv-429) was entered in the United States District Court. The CD formalizes an agreement between Georgia-Pacific LLC (Georgia-Pacific), the U.S. Environmental Protection Agency (USEPA), and the U.S. Department of Justice that will govern the next phase of work (i.e., RD) at the WB/A-Site OU.

The elements of this RD Work Plan are consistent with the selected Response Action specified in the Record of Decision (ROD) for the WB/A-Site OU (USEPA 2006) and the CD. Additionally, this RD Work Plan was prepared in accordance with the Superfund Amendments and Reauthorization Act of 1986, the National Oil and Hazardous Substances Pollution Plan, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 11, 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

Per the CD, this RD Work Plan provides for design of the remedy set forth in the ROD, which will be carried out in accordance with the Statement of Work (SOW) included as Appendix C to the CD to achieve the Performance Standards and other requirements set forth in the ROD, CD, and/or SOW. Specifically, the purposes of this RD Work Plan are to:

- Identify the relevant performance standards for the Remedial Action
- Summarize the key elements of the Remedial Action
- Describe the process for designing the Remedial Action and the revegetation/mitigation activities
- Describe the roles and responsibilities and authority of all organizations involved in developing, finalizing, and implementing the design activities. These organizations include USEPA, other federal and state partners, Georgia-Pacific, and ARCADIS (the supervising contractor)

This RD Work Plan is designed to facilitate USEPA review and approval of remedial and revegetation/mitigation design details. Georgia-Pacific anticipates that the Federal Trustees will review and provide comments on certain elements of the RD in conjunction with USEPA and Michigan Department of Natural Resources and Environment (MDNRE) (Previously Michigan Department of Environmental Quality [MDEQ]), but the responsibility for approval of this RD Work Plan and additional design submittals (if necessary) will rest solely with USEPA. Georgia-Pacific expects that USEPA will coordinate transmittal of any comments from each of the trustees and MDNRE and provide a single transmittal together with USEPA's comments to Georgia-Pacific for each of the design submittals. A Remedial Action Work Plan will be developed subsequent to the design process and will include a Mitigation Work Plan.

1.1 Scope of RD Work Plan

This RD Work Plan provides the overall management strategy for completing the RD, construction, maintenance and monitoring of the remedial action (RA) consistent with the CD and the SOW.

This RD Work Plan documents the responsibility, authority, and qualification of all organizations and key personnel; describes the design phases and the schedule to complete each phase under the design (including pre-design investigations) as well as the completion of the RA Work Plan; and describes the planning documents required under the CD and SOW.

1.2 Document Organization

This RD Work Plan consists of seven sections:

- Section 1: Introduction – States the objectives of this RD Work Plan;
- Section 2: Site Description – Describes the areas comprising the WB/A-Site OU;
- Section 3: Performance Standards and Remedial Action Objectives – Describes the selected components and objectives of the Remedial Action;
- Section 4: Design – Describes the design phases including Preliminary Design (50%), Pre-Final Design (95%), Final Design (100%), and the respective components associated with each design phase;
- Section 5: Project Roles and Responsibilities – Provides a description of the team organization structure and the key project team members;

- Section 6: Reporting and Documentation – Identifies the reporting and documentation requirements. This section also presents a schedule for completing design submittals; and

- Section 7: References – Provides a list of references used to prepare this document.

2. Site Description

The WB/A-Site OU consists of two disposal areas: the Willow Boulevard Site, which includes the Willow Boulevard Landfill and the Willow Boulevard Drainageway Area (approximately 11 acres), and the A-Site Landfill (approximately 22 acres). The two areas combined consist of 33 acres located southeast of the intersection of Interstate-94 and Highway M-96 (King Highway) in Kalamazoo, Michigan. The WB/A-Site OU is bordered by the Kalamazoo River to the north and northwest; light commercial properties to the east; and Willow Boulevard, former Olmstead Creek, and residential areas to the south (Figure 2).

The WB/A-Site OU is OU2, one of four land-based OUs associated with the Superfund Site. The WB/A-Site OU contains paper-making residuals (residuals), some of which contain measureable concentrations of polychlorinated biphenyls (PCBs). Investigations have been completed in several areas associated with the WB/A-Site OU as addressed in the ROD. These investigation areas, depicted on Figure 2, include:

- Willow Boulevard Landfill and A-Site Landfill
- Willow Boulevard Drainageway Area
- Area south of the A-Site Berm, including the former Olmstead Creek
- Area east of Davis Creek
- Area near monitoring well AMW-3A

The area east of Davis Creek, and the area near monitoring well AMW-3A are considered ancillary areas within the WB/A-Site OU. The Willow Boulevard Drainageway Area is considered in conjunction with the Willow Boulevard Landfill, while the former Olmstead Creek and the area south of the A-Site Berm are considered in conjunction with the A-Site Landfill. A detailed description of the WB/A-Site OU areas is provided in the Remedial Investigation/Focused Feasibility Study (MDEQ 2004) and a brief summary is provided below.

2.1 Willow Boulevard Landfill

Georgia-Pacific acquired the Willow Boulevard Site (Figure 2) with the acquisition of the Kalamazoo Paper Company in 1967. The Willow Boulevard Landfill received dewatered residuals consisting of clay and paper fibers excavated from the King Highway dewatering lagoons from the mid 1960s until disposal operations ceased in 1975. In April 1999, Georgia-Pacific implemented an interim response program for the Willow Boulevard Site. Interim

response activities included excavating residuals along the western bank of the river adjacent to the landfill, placing the materials in the eastern portion of the landfill, re-grading the landfill to promote stormwater drainage, and placing a 6-inch layer of clean soil on top of the landfill. A portion of the river edge was backfilled to create a soil berm along the Kalamazoo River and geotextile and riprap were placed along the riverbank at points along the northeastern edge of the Willow Boulevard Site to protect the banks from erosion.

2.2 A-Site

The A-Site (Figure 2) was originally a series of dewatering lagoons used by the Allied Paper Company's King Division Mill (Wilkins & Wheaton 1981) between 1960 and 1967. As residuals accumulated in the lagoons, the A-Site became known as the A-Site Landfill. Georgia-Pacific purchased the A-Site in 1975 and used it to dispose of paper residuals removed from the King Highway dewatering lagoons until 1977. Beginning in 1977, the A-Site received dewatered papermaking residuals from the Kalamazoo Mill filter press until active disposal in the area ceased in 1987.

In 1998, a sheet pile wall was installed at the A-Site Landfill along the length of the Kalamazoo River, extending approximately 150 feet along Davis Creek (Figure 2). This wall, installed to protect the north berm from erosion during high river levels, extends 2 feet above the 100-year flood elevation.

In December 2006, a Time-Critical Removal Action (TCRA) was initiated to remove residuals at two Georgia-Pacific owned mill properties (the Refuse Area at the Kalamazoo Mill Property and the Oxbow Area at the former Hawthorne Mill Property) associated with the Superfund Site. The materials removed from the mill properties were placed in the A-Site Landfill, a temporary soil cover was constructed over the materials, and erosion controls were installed.

2.3 Willow Boulevard Drainageway Area

The Willow Boulevard Drainageway Area (Figure 2) receives surface water runoff from the Willow Boulevard Landfill and surrounding areas. It is bordered by the Willow Boulevard Landfill to the north, the former Olmstead Creek to the east, Willow Boulevard to the south, and the Kalamazoo River to the west. Remedial investigations in 1999 confirmed that PCB-impacted residuals are present in this area.

2.4 Area East of Davis Creek

Davis Creek (Figure 2) originally followed the southern border of the A-Site and its outlet was located between the Willow Boulevard Site and the A-Site. In the early 1930s, a public works

project diverted the creek so that it flowed straight from Carleton Avenue north to the Kalamazoo River. In response to frequent flooding of the adjacent Lakewood neighborhood, the Kalamazoo County Drain Commission installed flood-diversion piping in 1972 under the Kalamazoo County Fairgrounds, Lakewood Elementary School, and Lake Street to divert a portion of the flow from Carleton Avenue directly to the Kalamazoo River.

Across Davis Creek to the east of the A-Site is a 3.5-acre vegetated area (with shrubs and trees) partially bordered by a low earthen berm (Figure 2). The berm forms a depression, and the area is prone to flooding. Decant water from dewatering activity at the A-Site was discharged to this area. A thin layer of residuals (generally less than 6 inches) has been observed in this area.

2.5 Area South of the A-Site Berm, including the former Olmstead Creek

The area south of the A-Site Berm (Figure 2) is a continuation of the A-Site and is also marked by the presence of residuals. This area is bounded by the A-Site Berm to the north, Davis Creek to the east, residential properties to the south, and the Willow Boulevard Drainageway Area to the west. Portions of the former Olmstead Creek are located within this area, and remedial investigations in 1999 confirmed that PCB-containing residuals are present.

The former Olmstead Creek (Figure 2) is an intermittent drainageway that begins within the area south of the A-Site Berm and flows west, separating the Willow Boulevard Site and A-Site. The former Olmstead Creek discharges surface water drainage from portions of the A-Site as well as from approximately 12 residential properties along Carleton, Melrose, St Joe, and Riverside Avenues to the Kalamazoo River through a culvert that separates the Willow Boulevard Site and the A-Site. Between November 1999 and April 2000, residuals from the confluence of the former Olmstead Creek and the Kalamazoo River were excavated, confirmatory samples collected, and the area was backfilled with clean material.

2.6 Area Near Monitoring Well AMW-3A

Another area associated with the A-Site is the area near monitoring well AMW-3A, a 0.25-acre area located southeast of the WB/A-Site OU (Figure 2). This area lies west and immediately adjacent to Davis Creek, approximately 1,100 feet south of the Kalamazoo River and 175 feet south of the A-Site at the eastern end of Carleton Avenue. A residential neighborhood lies to the west. In 2000, the fence line along the western side of the area near monitoring well AMW-3A was relocated approximately 3 feet to the western Georgia-Pacific property line to create a barrier between residential properties and the Georgia-Pacific property.

3. Performance Standards and Remedial Action Components

The Remedial Action for the WB/A-Site OU will address existing residuals, soils, and sediments containing PCBs at concentrations above relevant criteria. Consolidation and containment of the PCB-impacted materials, in conjunction with institutional controls, are the key elements of the selected remedy set forth in the ROD. Revegetation and mitigation activities will address environmental impacts associated with implementation of the Remedial Action at the landfills and ancillary areas (described in Section 2).

3.1 Performance Standards and Remedial Action Objectives

The performance standards for the Remedial Action at the WB/A-Site OU include cleanup standards, standards of control, quality criteria, and other substantive requirements, criteria, or limitations, including Applicable or Relevant and Appropriate Requirements, as set forth in the ROD, SOW, and CD.

Given the current scope of work, the relevant performance standards include, but are not limited to:

- Part 201 Generic Commercial II and Industrial Land Criterion of 16 milligrams per kilogram (mg/kg) PCBs in soil, which is to protect the health for onsite workers and/or trespassers.

- Part 201 Generic Residential Land Use Criterion of 4 mg/kg PCBs in soil, which is to protect human health for residential land use.

- The No Observed Adverse Effect Level to Lowest Observed Adverse Effect Level range of 6.5 to 8.1 mg/kg (Camp Dresser & McKee, Inc. [CDM] 2003a) in soil and/or sediment to protect terrestrial ecological receptors (i.e., the American Robin).

- The default sediment cleanup criterion specified in the human health risk assessment of 0.33 mg/kg (CDM 2003b) to protect people consuming fish.

Established performance standards are identified based on the expected nature and scope of work implemented to complete the Remedial Action. Soil remediation is anticipated to occur primarily on property owned by Georgia-Pacific that is zoned for light industrial use. Removal activities are also planned for a small portion of the Carlton Avenue property, which is also zoned for light industrial use due to its location next to the Georgia-Pacific property. As described in the ROD, the soils on residential properties adjacent to the WB/A-Site OU do not pose a threat to people or ecological receptors. If, however, the scope of removal activities

expands beyond what is currently anticipated in the RD Work Plan and removal work is necessary on residential properties, the Part 201 Generic Residential Land Use Criterion listed above will be applied.

The final approach for application of the cleanup standard for each area of the WB/A-Site OU, will be developed in collaboration with USEPA. Application of cleanup standards for each area of excavation will be further described in the Preliminary Design process.

As specified in the ROD, the Remedial Action Objectives at the WB/A-Site OU are to:

- Eliminate exposure to PCB-impacted material exceeding applicable land-use and/or risk-based cleanup criteria
- Prevent PCB migration via erosion or surface water runoff to the Kalamazoo River
- Mitigate, to the extent practicable, adverse environmental effects due to implementation of a remedial action

Implementing the selected remedy and revegetation/mitigation activities at the WB/A-Site OU – which include excavation, installation of a cap over both the Willow Boulevard and A-Site Landfills, installation of erosion protection and containment systems, mitigation of impacts associated with implementation and impacts to specific wetland habitats, short- and long-term monitoring, institutional controls, and long-term maintenance – will meet or exceed the performance standards and satisfy the Remedial Action Objectives. Specifically, the selected remedy will minimize exposure to PCB-containing material through placement of an engineered cap or clean backfill, and mitigate adverse environmental effects resulting from implementation of the Remedial Action.

3.2 Summary of Remedial Action Components

The major components of the Remedial Action, as described in the SOW, include the following:

- "Evaluate the presence of the 1,700 foot-long sheet pile wall at A-Site and its impact on the execution of the remedial action". As described in Section 3.2.1 below, the design is currently anticipated to include removal of the portion of this sheet pile wall that extends above the water line (elevation to be established in the preliminary design) of the Kalamazoo River.

- Excavate along the banks of the Kalamazoo River and in the additional areas described in Section 2 (including the Willow Boulevard Drainageway, area south of A-Site Berm, area east of Davis Creek, and the area near monitoring well AMW-3A), per Section II.1 of the SOW.

- Consolidate and isolate PCB-containing materials under an engineered cap over both landfills. The design of the cap will be in compliance with the relevant requirements of Part 115 Solid Waste Management, of the Natural Resources and Environmental Protection Act (NREPA) cap specifications for closure of a solid waste disposal facility.

- Implement bank stabilization and erosion control measures to protect the cap and contents of the landfills from a 100-year flood and address impacts of construction.

- Restore impacted wetlands in the area east of Davis Creek, in the Willow Boulevard Drainageway, and in the area south of the A-Site Berm.

- Install erosion protection and containment systems.

- Implement short- and long-term monitoring programs.

- Implement institutional controls.

- Implement long-term maintenance.

- Implement additional provisions (e.g., mitigate noise and dust levels) as needed.

Each of these components is summarized below.

3.2.1 Evaluate the Presence of the Sheet Pile Wall at A-Site

The sheet pile wall currently in place along the northern perimeter of the A-Site Landfill was installed as an interim response measure under the authority of Michigan Public Act 307 with the approval of MDEQ. The wall is designed to prevent the erosion of the berm separating the A-Site from the Kalamazoo River. Measures specified by MDEQ to mitigate impacts to local habitat were integrated into the design and construction of the wall.

It is currently anticipated that the 1,700 foot-long sheet pile wall will be cut off near the water line (at an elevation to be determined in the design) and the section of sheet pile that extends above this line will be removed. Prior to removing the sheet pile wall, the material behind the

wall will be excavated and the berm will be regraded at a slope ratio of 3H:1V (horizontal to vertical) if this is determined to be stable for the material encountered in the area (to be confirmed during the pre-design investigation described in Section 4.1.1). If paper residuals are encountered during excavation and regrading of the berm, they will be relocated to the extent practicable. After excavation, the area will be backfilled with clean soil to create a clean soil berm/setback between the Kalamazoo River and the paper residuals consolidated in A-Site Landfill. The sheet pile wall will then be cut and the remaining exposed slope will be re-established with native vegetation and rock armoring as described in Section 3.2.4. The vegetation and armor will protect the slope during high-water events and create some natural habitat. Additionally the berm will provide for the installation of groundwater monitoring wells along the Kalamazoo River and Davis Creek. Figure 3 shows the approximate length of sheet pile proposed to be removed.

3.2.2 Excavation

Pre-Excavation – As described in the Remedial Investigation Report (RI Report; MDEQ 2004), field reconnaissance and sampling activities were conducted to identify the horizontal and vertical extent of PCB-impacted material. Additional delineation activities to be carried out prior to design are outlined in Section 4.1.

Excavation – Materials containing PCBs above relevant cleanup standards listed in Section 3.1 will be excavated from the area south of the A-Site Berm, including a portion of the former Olmstead Creek; the area east of Davis Creek; the Willow Boulevard Drainageway (Figure 4); and the area near monitoring well AMW-3A (Figure 5). Confirmation sampling will be carried out to verify all targeted materials are removed.

As stated in the SOW, if, subsequent to the excavation and confirmation sampling, USEPA determines that the relevant cleanup standard has not been achieved, USEPA will consult with MDNRE and Georgia-Pacific regarding (1) whether additional remedial actions will be effective in achieving the cleanup standard in the area; and (2) the potential nature of such additional remedial actions. In determining whether and how to proceed with additional remedial activities, USEPA will consider the extent and concentration of the remaining PCBs in the area(s).

The northern river banks of the Willow Boulevard Landfill will be excavated to provide sufficient slope and area to construct a setback from the Kalamazoo River. The setback area will be established to limit a potential hydraulic connection and physical contact between the PCB-containing materials isolated within the landfill and surface water in the Kalamazoo River. Additionally, the area created by the setback will be designed to serve as a buffer zone,

allowing for the creation of a vegetated riparian corridor and installation of and access to groundwater monitoring wells.

Post-Excavation – The excavated material from the northern part of the A-Site, the area south of the A-Site Berm, the area east of Davis Creek, and the area near monitoring well AMW-3A will be dewatered, as necessary, and consolidated with existing materials at the A-Site Landfill. All material excavated from the northern banks of the Willow Boulevard Site and the Willow Boulevard Drainageway will be dewatered and consolidated at the Willow Boulevard Landfill. Once the excavation of targeted materials is complete (as determined using visual criteria) and sampling has been carried out to confirm that the relevant cleanup criteria have been reached, the excavated areas will be backfilled with clean soil and revegetated.

3.2.3 Material Consolidation and Cap Installation

An engineered barrier (cap) will be installed over the consolidated materials at the Willow Boulevard and A-Site Landfills. The design of the cap will be in compliance with the relevant requirements and cap specifications for closure of a solid waste disposal facility included in Part 115 Solid Waste Management, of the NREPA.

The cap will be constructed to isolate PCB-impacted material by minimizing both contact by surface water runoff or erosion and infiltration of precipitation through the landfills. The purpose of the cap is to minimize PCB migration from the landfills into the groundwater and the Kalamazoo River, and to help prevent human or ecological exposures to PCB-containing residuals within the landfills.

It is anticipated that the cap will be designed with a flexible membrane liner, which will be supported by a 6-inch thick gas venting soil cushion layer and protected by a minimum 2-foot thick soil drainage layer. This drainage layer will provide lateral precipitation drainage, limit frost penetration into the cover system, and protect the flexible membrane liner from degradation. This layer will also be covered by 6 inches of topsoil to support vegetation. Additionally, the slopes of the cap (anticipated to be at a slope no steeper than 4H:1V) will be designed to withstand a 100-year flood event and will appropriately direct drainage and surface water runoff.

3.2.4 Mitigation of Impacts to the Riparian Corridor behind the Sheet Pile Wall and in the Willow Boulevard Setback

The existing berm behind the sheet pile wall will be excavated to expose the sheet pile at the toe of the berm. The excavated material will be dewatered, as necessary, and consolidated at

the A-Site Landfill. Temporary erosion controls will then be installed along the length of the excavated area.

A layer of river run rock approximately 1 to 2 feet thick will be installed along the water side of the remaining sheet pile (following removal) into the Kalamazoo River to mask the wall and provide additional habitat along the shoreline. A hydraulic model will be developed and run to compute elevation and velocity values for the Kalamazoo River in front of the Willow Boulevard Site (the area of the WB/A-Site OU where the Kalamazoo River is most narrow). The velocity results will be used to determine the most appropriate form of erosion protection; however, it is expected that bank will require, as a minimum, planting with short native and bunch grass, in combination with rock armoring, for slope protection. A typical conceptual cross-section of the proposed slope protection measures is shown on Figure 6 (the location of the cross-section is identified on Figure 3).

3.2.5 Mitigation Impacts in the Ancillary and Adjacent Areas

Impacts of implementation and other environmental impacts will be addressed in approximately 3 acres of wetland in the area east of Davis Creek (Figure 2). Post-excavation final grading in this area will incorporate establishment of hummock and hollow topography in the wetlands along Davis Creek. During final grading, the soils will be evaluated for their suitability as a planting medium, and a minimum of 6 inches of topsoil will be imported if soils are determined to be inadequate. Hollows will be seeded or planted with herbaceous native vegetation that tolerates frequent inundation, and hummocks may be seeded and planted with trees and shrubs suited for such hydrologic conditions.

Impacts will also be addressed in the excavated area south of the A-Site Berm, including the former Olmstead Creek, by creating approximately 3.5 acres of wetland, woodland, and riparian corridor habitat (Figure 7), consisting of palustrine wetland and woodland habitats. The excavation planned for the areas where wetlands creation/impact mitigation is proposed will lower the surface elevation—this will allow expansion of existing emergent wetlands by creating suitable hydrologic conditions. These areas that are not subject to inundation by water will be seeded with a native wetland seed mix. Also identified on Figure 7 is an area of riparian woodland corridor at the southern end of A-Site. The area will be vegetated with native trees, shrubs, and herbaceous ground cover.

Approximately 0.25 acres of the excavation in the area near monitoring well AMW-3A area will be restored by backfilling with clean material to pre-excavation grade. The bank adjoining Davis Creek, which forms part of this area, will also be restored to a stable slope and vegetated.

It is anticipated that the excavations in Willow Boulevard Drainageway Area will also be backfilled with clean fill. The areas disturbed by excavation activities will then be vegetated.

3.2.6 Erosion Control and Containment System

Bank stabilization and erosion control measures will be implemented at the Willow Boulevard and A-Site landfills in compliance with the relevant requirements of state and federal laws. These include:

- Part 115, Solid Waste Management
- Part 301, Inland Lakes and Streams, of the NREPA
- Part 91, Soil Erosion and Sedimentation Control, of NREPA
- Part 303, Wetlands Protection, of NREPA
- U.S. Clean Water Act
- Rivers and Harbors Act

Bank stabilization and erosion control measures will be implemented to protect both the cap and the contents of the landfills from a 100-year flood, and will reduce the potential for PCB migration into the Kalamazoo River and adjacent areas.

A-Site Landfill – The lower portion of the sheet pile wall will remain in place to provide stability to the re-graded bank behind it. In areas where there is no sheet pile wall, the existing dike soils will be re-graded to achieve a gentler, stable slope. As described in Section 3.2.1, the excavation, re-grading, and backfilling activities conducted as part of the sheet pile removal work will result in a clean setback between the Kalamazoo River and the materials consolidated in A-Site Landfill.

Erosion control methods can generally be classified as armor protection, indirect protection, and vegetation. Armor is protective material such as rock that has sufficient weight and strength that, when in direct contact with the river, can withstand hydraulic forces and impact. This approach is typically used to protect the toe of the bank. Indirect protection includes structures that extend into the stream channel and redirect flow to reduce hydraulic forces at the channel boundary to a non-erosive level, such as a dike or a weir. Vegetation is the basic component of bioengineering. Plants are used to provide the function of either armor or indirect

protection, and often have the added benefit of improving environmental aesthetics and wildlife habitat. Bioengineering techniques, such as brush layering, live stakes, or joint planting, use the inherent properties of the planted vegetation to serve as the bank stabilization armor.

Willow Boulevard Landfill – In places where there are not adequate dikes, an earthen berm or shallow swale will be constructed to physically separate the landfill from adjacent properties and minimize runoff of stormwater from the landfill. In areas of the berm that are subject to erosion, additional erosion control measures will be implemented, such as riprap, articulated concrete systems, GeoWeb materials, or revetment blankets.

3.2.7 Short-Term Monitoring

Short-term monitoring will be implemented for both surface water and air. Surface water will be monitored during construction and excavation activities as appropriate to verify that public health, safety, welfare, and the environment are protected in accordance with state and federal law; including Part 31, Water Resources Protection, of NREPA and the Clean Water Act's Ambient Water Quality Criteria. The monitoring program will be defined as part of the RD. Air monitoring will also be performed to verify that construction activities remain in compliance with rules prohibiting the emission of air contaminants and dust in quantities that may be injurious to human health, animal life, plant life of significant economic value, and/or property as established in Part 55, Air Pollution Control of NREPA (Part 55) and the Federal Clean Air Act.

3.2.8 Long-Term Groundwater Monitoring

Upon completion of construction activities, a long-term groundwater monitoring program will be implemented and will continue until USEPA determines that it is no longer necessary. This program will be evaluated during the five-year review and each subsequent review, as required under the National Contingency Plan, 40 C.F.R. Part 300 (as amended).

The groundwater monitoring program may require installation of additional monitoring wells along the A-Site berm and Willow Boulevard setback, or abandonment of existing wells if they are no longer necessary. Results of an evaluation of the existing monitoring well construction network and proposed modifications will be developed as part of the RD. Both the number and location of monitoring wells will be subject to USEPA approval. Additionally, groundwater monitoring will be conducted in accordance with Part 201, Environmental Remediation, of the NREPA.

3.2.9 Institutional Controls

Institutional controls to be implemented at the WB/A-Site OU include fencing around the landfill, permanent markers around the boundary, and warning signs on the fence every 200 feet and on all of the entry gates. The number, content, and location of the permanent markers and warning signs will be established during development of the RD.

3.2.10 Long-Term Maintenance and Monitoring

Long-term maintenance and post-closure care will be implemented as part of the Remedial Action. An Operation and Maintenance (O&M) Plan, which will include the proposed approach for the monitoring and maintenance of the sheet pile wall, cover system, gas venting system (which will include long-term gas monitoring), erosion control measures, fencing, groundwater monitoring wells, and drainage structures (among other items) will be developed as part of the RD. The O&M Plan will also include monitoring procedures for identifying and addressing invasive species in new plantings established across the WB/A-Site OU, as well as the approach for monitoring the areas of wetlands and other habitats created or enhanced as described in Section 3.2.5.

3.2.11 Other Provisions

Additional measures will be implemented during construction activities to minimize disturbances (including noise level and dust emissions) to the surrounding community. Dust monitoring will be performed to confirm compliance with Part 55 and the federal Clean Air Act, while noise levels will be monitored to maintain compliance with local ordinances. Appropriate control/mitigation measures will be described in the RD.

4. Design of the Remedial Action

This RD Work Plan was developed in accordance with the ROD, CD, and SOW. This section discusses the tasks necessary to complete design work (including pre-design) activities required by the SOW, and provides an overall management strategy to complete these tasks.

For clarification purposes, this section discusses pre-design technical components of the remedy specified in the ROD (USEPA 2006) that are required to be evaluated during the design phase. This section also includes a discussion of tasks for each design phase with a schedule of activities.

As part of the overall management strategy for completing remediation and mitigation work, activities will be observed and documented (e.g., design, construction, monitoring, sampling) to verify that the remediation and mitigation activities are performed in accordance with the design. Additionally, the submittal/deliverable process will be managed to confirm that documentation and reporting associated with closure of the WB/A-Site OU is consistent with the Quality Management Plan (ARCADIS 2009a).

4.1 Pre-Design Technical Components

As required by the SOW, specific remedy components need to be evaluated and finalized during the design phases. Early clarification of the project components described below is intended to benefit the overall efficiency of the design process. Additional technical evaluations will be submitted with subsequent design submittals. The pre-design information will supplement existing information described in the RI Report and will be sufficient to complete the RD.

4.1.1 Pre-Design Geotechnical Investigation and Further Characterization of Residuals

A subsurface investigation (i.e., a drilling program) will be completed in targeted areas of the WB/A-Site OU to: 1) characterize geotechnical properties of soils, and 2) further characterize the presence of residuals. The information gathered related to geotechnical properties will be used to perform design analyses including slope stability analysis in support of berm and final cap, slope, and erosion protection system designs. Before drilling begins, borings will be located and surveyed by a licensed surveyor. Proposed geotechnical and delineation boring locations are shown on Figure 8.

Eight geotechnical soil borings will be located along the perimeter of the assumed critical slope areas at the Willow Boulevard Site. Four of these borings will be located along the western side

of the Willow Boulevard Site to verify past construction activities in this area. Six delineation borings will be located along the southern side of Willow Boulevard Site, in the Drainageway area, to complete the existing data set in this location. Boring locations are shown on Figure 8.

Six geotechnical borings will be located along the perimeter slopes of the A-Site Landfill, adjacent to the Kalamazoo River and Davis Creek where it is planned to remove the existing sheet pile wall and contour the slopes of the berm to a 3 Horizontal:1 Vertical (3H:1V) grade (see section 3.2.1 for clarification of those areas anticipated to accommodate a 3H:1V slope). One additional boring will be advanced near the center of the A-Site, where the longest slopes are present, and another geotechnical boring location is proposed along the southern slope of the A-Site (see Figure 8). The data obtained from these borings will be used primarily to verify landfilled paper residual thickness and estimated strength. Six delineation borings will be located on the northern side of the A-Site. One of the delineation borings will be co-located with geotechnical borings.

4.1.1.1 Geotechnical Soil Boring Methods

Geotechnical soil borings will be advanced using 4.25-inch inside diameter hollow-stem augers driven to an average depth of approximately 30 feet below ground surface (ft bgs). Standard Penetration Testing (SPT) (American Society for Testing Materials [ASTM] 1586) soil samples will be collected continuously using a 2-inch split-spoon sampler, visually described, and stored for laboratory testing. Depending on the subsurface conditions, undisturbed soil samples (i.e. Shelby tubes) may be collected at the discretion of the on-site geotechnical engineer.

The onsite geotechnical engineer will supervise drilling, and direct the drillers to perform Shelby tube sampling, as necessary, record blow counts on the split-spoon sampler, log the borehole, record groundwater elevations, and document details related to the advancement and sampling of each boring.

4.1.1.2 Geotechnical Soil Sampling

SPT samples will be collected from the borings and tested for the following parameters:

- Moisture content as a percentage of dry weight (ASTM D2216)
- Atterberg limits (ASTM D4318)
- Grain-size analysis with hydrometer (ASTM D422)

- Specific gravity (ASTM D854)
- Consolidated undrained triaxial shear test (ASTM D4767)
- Direct-shear test (ASTM D3080)

Performance of a consolidated/undrained triaxial (CU) shear test (ASTM D4767) will require the collection of an undisturbed Shelby Tube. As stated above, Shelby Tubes will be collected at the discretion of the field engineer.

Modifications to the soil boring and laboratory test program may be required depending on subsurface conditions and materials encountered.

4.1.1.3 Soil Boring Methods

To further characterize the presence of residuals, soil borings will be advanced to an average depth of approximately 25 ft bgs (except in the locations where the delineation boring is combined with a geotechnical boring, in which case the delineation boring will be advanced to 30 ft bgs using a hollow-stem auger).

The field engineer/geologist will supervise drilling, log the borehole, record groundwater elevations, and document details related to the advancement and sampling of each boring.

4.1.2 Pre-Design PCB Sampling

To define the extent of necessary excavation in the areas of Willow Boulevard Drainageway, area south of A-Site Berm, and area east of Davis Creek, soil samples will be collected from the 37 locations identified on Figure 9 (13 samples in the Willow Boulevard Drainageway, 20 in the area south of A-Site berm, and 4 in the area east of Davis Creek) and analyzed for PCBs. These samples will be analyzed for PCBs in accordance with the *Multi-Area Field Sampling Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site* (ARCADIS BBL 2007a)and its associated addenda, and the *Multi-Area Quality Assurance Project Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site* (ARCADIS 2009c).

At each location, samples will be collected from the 0 to 1-foot, the 1 to 2-foot, and the 2 to 3-foot intervals using a 2-inch hand auger (or equivalent method). Soil samples will be collected and sent to a laboratory for PCB analysis using SW-846 Method 8082. Field activities will be conducted in accordance with the *Multi-Area Health and Safety Plan for the Allied Paper,*

Inc./Portage Creek/Kalamazoo River Superfund Site (ARCADIS BBL 2007b) and associated addenda.

4.1.3 Pre-Design Site Topographic Survey

A topographic survey is proposed north of the sheet pile wall at A-Site and north of the riprap at Willow Boulevard. This survey is required to gain an understanding of the existing conditions of the Kalamazoo River in this area to design the habitat mitigation approach and select the appropriate material that will be placed outside the limits of final cover at the sites. The survey information would be combined with data already collected during topographic survey work performed by Prein and Newhof in 2007.

The following survey components are proposed:

- A-Site
  - Toe of the sheet pile wall (entire length of the wall)
  - Limit of any visible previously placed stone adjacent to the outside edge of the sheet pile wall
  - At increments of 5, 10 and 25 feet from the toe of the sheet pile wall into the Kalamazoo River to determine the elevation of the bottom of the riverbed – a description of the river bed material will be provided (e.g., riprap, soil, vegetation, etc.)
- Willow Boulevard
  - Topographic conditions between the northern limit of the riprap at Willow Boulevard (as shown on the 2007 survey performed by Prein and Newhof) to the shoreline
  - At increments of 5, 10 and 25 feet from the shoreline into the Kalamazoo River to determine the elevation of the bottom of the riverbed – a description of the river bed material will be provided (e.g., riprap, soil, vegetation, etc.)

The survey will be performed every 100 feet along Willow Boulevard and A-Site perpendicular to the flow direction of the Kalamazoo River and in additional areas where a significant change in vertical or horizontal topographic conditions is identified.

4.2 Design Process and Phases

Engineering plans and technical specifications will be prepared for implementing the Remedial Action at the WB/A-Site OU. Per the SOW, USEPA will approve the RD. Georgia-Pacific expects that USEPA will coordinate transmittal of any comments from each of the trustees and MDNRE and provide a single transmittal together with USEPA's comments to Georgia-Pacific for each of the design submittals. Parallel review is essential to maintaining the overall schedule for successful implementation of the Remedial Action.

Engineering Design plans and specifications will be developed in accordance with USEPA's Superfund Remedial Design and Remedial Action Guidance (USEPA Office of Solid Waste and Emergency Response Directive No. 9355.0-4A). The RD work products will be submitted to USEPA in phases as described below.

4.2.1 Preliminary Remedial Design (50%)

A Preliminary Design Report will be submitted to USEPA for review and approval when the design effort is approximately 50% complete. Per the SOW, the Preliminary Design Report submittal will include or discuss the following:

- Results of field sampling and pre-design work
- Project delivery strategy
- Preliminary plans, drawings and sketches, and design calculations, which include the Draft Engineering Design Report and the Draft Performance Standards Verification Plan (PSVP)
- Design criteria
- An outline of required specifications
- Proposed siting/locations of process/construction activities
- Expected long-term monitoring and operation requirements
- Proposed cleanup verification methods, including compliance with applicable or relevant and appropriate requirements
- Draft Contingency Plan (which may form part of the Preliminary Design Report)

- Real estate, easement, restrictive covenant, and permit requirements
- Preliminary construction schedule, including contracting strategy
- Plans and designs for implementation of the mitigation activities;
- A description of implementation methods and techniques
- A description of the equipment to be employed, including capacity, size, and materials for construction
- Seeding and planting plans, including species lists, proposed source(s) of materials, planting density and configurations, timing, and performance measures through the initial establishment of vegetation (2-3 years)
- Cut and fill volume determinations and suitability analysis of fill material
- Erosion and sediment control plans – proposed engineering controls
- Analysis statement (or defense) regarding the long-term management of the new wetland habitat, supported by the appropriate models (a plan to mitigate impacts associated with implementation of the Remedial Action and impacts to specific wetland habitat is anticipated to be included as a section in the Remedial Action Work Plan)

4.2.2 Pre-Final Remedial Design (95%)

The Pre-Final Design Report will be submitted to USEPA when the design effort is 95% complete. This submittal will address any formal comments from USEPA on the Preliminary Design submittals. The Pre-Final Design Report will serve as the Final Design if USEPA and the Federal Trustees have no further comments and work will proceed based on the Pre-Final Design Report.

4.2.3 Final Remedial Design (100%)

The Final Design Report will be submitted to the USEPA when the design effort is 100% complete. The Final Design Report will address USEPA formal comments on the Pre-Final Design submittals and will include reproducible drawings and specifications suitable for bid advertisement. Unless otherwise directed by USEPA in the approval of this RD Work Plan, the

Pre-Final and Final Design Report submittals will include the elements listed for the Preliminary Design, as well as the following:

- Final plans and specifications
- Draft WB/A-Site OU O&M and Environmental Impact Mitigation O&M Plans
- Construction QAPP (CQAPP) will detail the approach to quality assurance (QA) during activities at the WB/A-Site OU and specify a QA official to conduct a QA program during the construction phase of the project
- Contingency Plan
- The PSVP will explain in detail which mechanism will be implemented to confirm that the mitigation and restoration activities achieve the overall revegetation and mitigation objectives developed and defined in the SOW schedule

5. Project Roles and Responsibilities

The anticipated project organization, including key personnel and descriptions of duties and responsibilities for the design program is provided below.

5.1 USEPA

USEPA will serve as the lead regulatory agency for implementation of the Remedial Action and will approve the plan for activities designed to mitigate impacts associated with implementation and impacts to specific wetland habitats described in this RD Work Plan. USEPA will be consulted as appropriate on decisions that must be made based on field conditions observed at the WB/A-Site OU at the time of construction. The USEPA Project Manager is Mr. Michael Berkoff, who will be responsible for providing and coordinating regulatory oversight and direction. Additionally, USEPA will be responsible for coordinating communications with the MDNRE and Trustees, as appropriate. The USEPA engineering constructability contact is anticipated to be Sam Borries.

5.2 Natural Resource Federal Trustees

The Federal Trustees include the U.S. Department of the Interior, represented by the U.S. Fish and Wildlife Service (USFWS), and the U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA). The Federal Trustees will have an opportunity to review design and provide comments. The Federal Trustees may be consulted on decisions that must be made based on field conditions observed at the WB/A-Site OU at the time of construction. Meetings or calls that will include a discussion of activities to mitigate impacts to habitat may include the Federal Trustees. Federal Trustee contacts include Lisa Williams (USFWS) and Todd Goeks (NOAA)

5.3 MDNRE

During design and implementation of the Remedial Action, MDNRE will work closely with USEPA. MDNRE's primary contact is Mr. Paul Bucholtz.

5.4 Natural Resource State Trustees

Meetings or calls that include a discussion of activities to mitigate impacts to habitat will also include the State Trustees. State Trustees include the Michigan Attorney General and natural resource divisions of MDNRE. State Trustee contacts include Judith Alfano (MDNRE

Remediation Division), Sharon Hanshue (MDNRE – Fisheries Division), and Polly Synk (Department of Attorney General).

5.5 ARCADIS

ARCADIS will prepare the Preliminary, Pre-Final, and Final Design deliverables. Additionally, ARCADIS will implement the Remedial Action at the WB/A-Site OU. The ARCADIS primary contact is anticipated to be Mr. Patrick McGuire. The ARCADIS Engineer of Record is anticipated to be Mr. William Rankin, P.E., MI 044550. Qualifications of key ARCADIS staff are included in the Statement of Qualifications for Willow Boulevard/A-Site Landfill (ARCADIS 2009b). It is anticipated that ARCADIS will coordinate technical design details and design submittals directly with USEPA.

5.6 Georgia-Pacific

Georgia-Pacific is the Settling Defendant under the CD and Client for ARCADIS. Georgia-Pacific will finance and perform the RD and Remedial Action in accordance with the CD, ROD, SOW, and all work plans and other plans developed for the project and approved by USEPA. Georgia-Pacific will review all documents prepared by ARCADIS prior to submittal to USEPA. The primary contact for Georgia-Pacific is Mr. Garry Griffith, P.E. It is anticipated that Mr. Griffith will coordinate with USEPA on matters concerning compliance with the CD and supporting documents and will attend any meetings involving USEPA and the Federal and State Trustees.

6. Reporting and Documentation

In addition to the design deliverables, progress reports will be submitted to USEPA in accordance with the CD, Section IX-31, Remedial Design. As outlined in the SOW, the progress reports will be submitted quarterly during the design process and monthly during construction, unless otherwise specified by the USEPA project manager. The reports will include the following information, as appropriate:

- Activities performed during the previous month and the results of data collection activities
- Problems encountered during the previous month
- Schedule variances and corrective actions, if necessary
- Projected activities for the next 6 to 12 weeks

It is also anticipated that monthly conference calls will be held between USEPA, Georgia-Pacific, ARCADIS, and other trustees as required, to discuss the progress of the RD.

The following table summarizes the schedule for key design deliverables. An overall Project Schedule is included in Appendix A.

Table 6-1 Summary of Key Design Deliverables

Deliverable	Milestone Due Date (calendar days)
Draft RD Work Plan (already submitted)	November 7, 2009
Progress Reports	November 15th, 2009, then quarterly through design phase
Pre-Design Sampling	To begin following USEPA approval of the RD Work Plan and Field Sampling Plan, (per prior discussions with USEPA, the Topographic Survey will be performed prior to RD Work Plan approval, with notice to USEPA of planned field schedule)
Preliminary Design Report (50 %)	90 days after receipt of all validated pre-design sample results
Pre-Final Design Report (95 %)	120 days after receipt of comments on the Preliminary Design Report from USEPA
Final Design Report (100 %)	60 days after receipt of comments on the Pre-Final Design Report from USEPA
Remedial Activity Work Plan	30 days after USEPA approval of the Final Design Report

7. References

ARCADIS, 2009a. *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site - Quality Management Plan*. May 2009.

ARCADIS, 2009b. *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Willow Boulevard/A-Site Landfill Operable Unit - Statement of Qualifications – Remedial Design/Remedial Action.* May 2009.

ARCADIS. 2009c. *Multi-Area Quality Assurance Project Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Revision 1 (Draft).* November 2009.

ARCADIS BBL. 2007a. *Multi-Area Field Sampling Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Revision 1.* October 2007.

ARCADIS BBL. 2007b. *Multi-Area Health and Safety Plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.* May 2007.

CDM. 2003a. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site – Final (Revised) Baseline Ecological Risk Assessment, April 2003.

CDM. 2003b. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site – Final (Revised) Human Health Risk Assessment, May 2003.

Fischenich, C. 2001. Stability thresholds for stream restoration materials. EMRRP Technical Notes Collection, U.S. Army Engineer Research and Development Center, May 2001.

Michigan Administrative Code. 1995. Part 201, Environmental Remediation, of Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, and Part 201 Administrative Rules.

MDEQ. 2004. Remedial Investigation/Focused Feasibility Study.

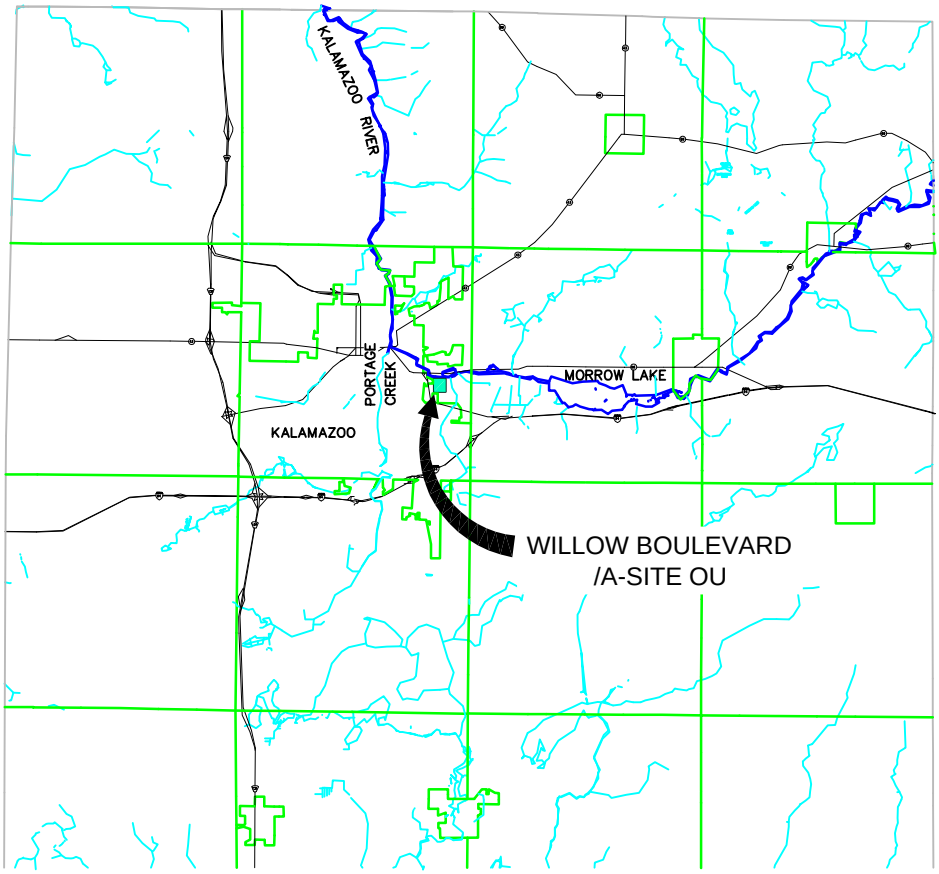
Transportation Research Board. 2005. Environmentally Sensitive Channel- and Bank-Protection Measures, October 2005.

USEPA. 2006. Willow Boulevard/ A-Site Landfill Operable Unit 2 Record of Decision, September 2006.

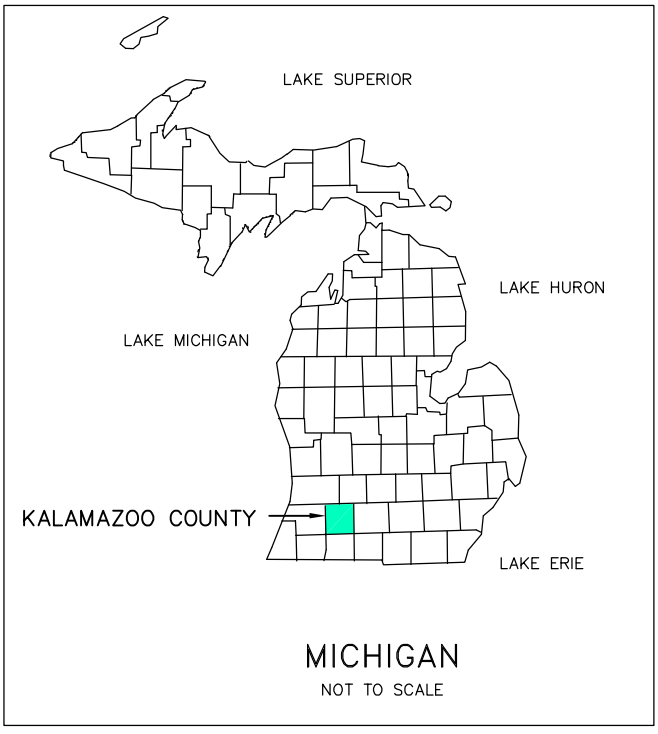
Wilkins & Wheaton Engineering Company. 1981. Georgia-Pacific Kalamazoo Paper Division Residuals Management Plan, January 1991.

ARCADIS

Figures



KALAMAZOO COUNTY



SCALE

NOTE:

KALAMAZOO COUNTY MAPPING OBTAINED FROM MICHIGAN RESOURCE INFORMATION SYSTEM.

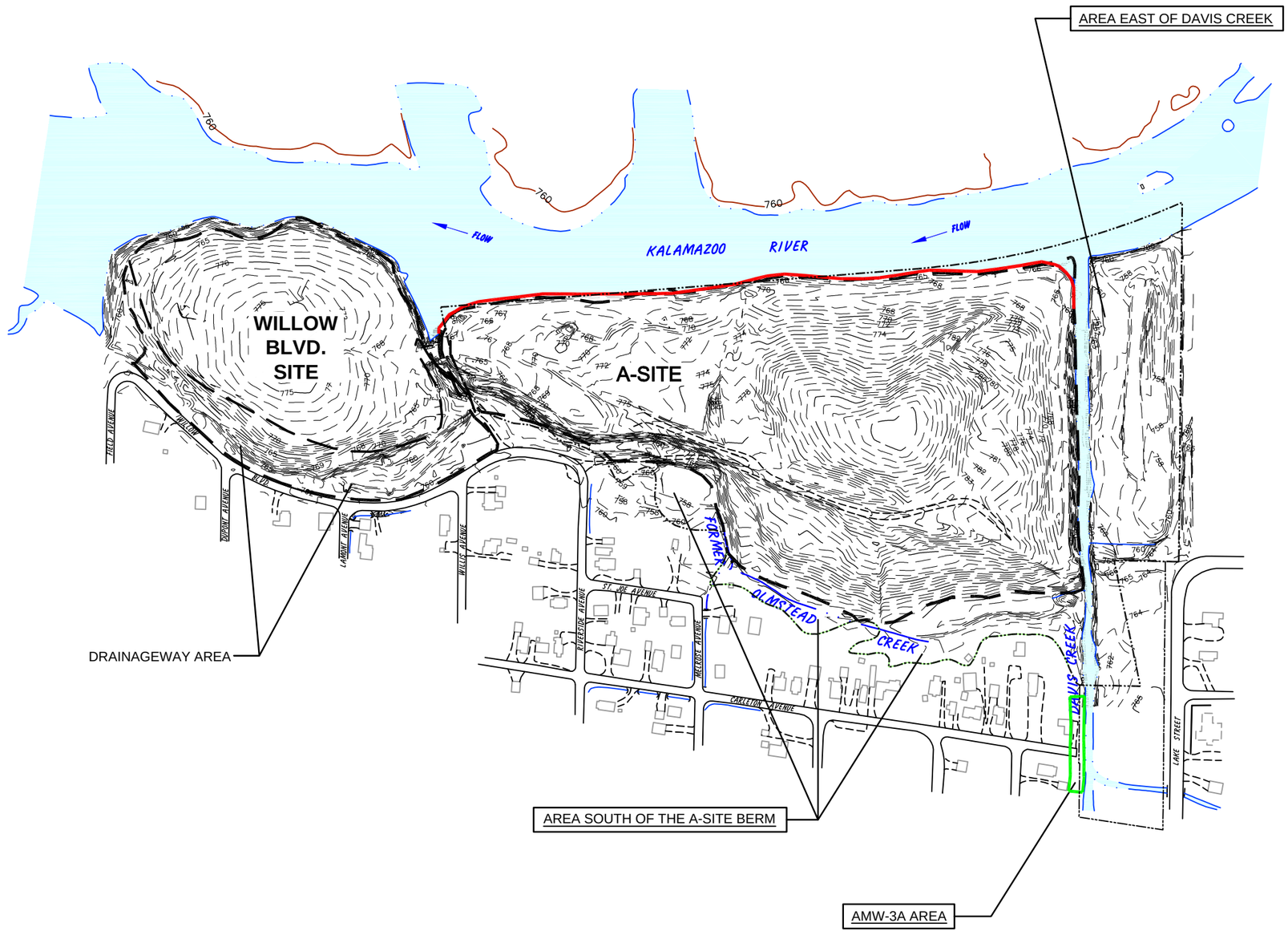
GEORGIA-PACIFIC LLC
ALLIED PAPER,INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

SITE LOCATION PLAN

ARCADIS

FIGURE
1



LEGEND:

- ELEVATION CONTOUR (NGVD 1929)
- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- APPROXIMATE A–SITE BOUNDARY
- GEORGIA–PACIFIC LLC PROPERTY BOUNDARY OUTSIDE OF A–SITE
- EXISTING SHEETPILE WALL

NOTES:

1. BASE MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
2. TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, MAY 2007.
3. ALL LOCATIONS ARE APPROXIMATE.

0 300' 600'

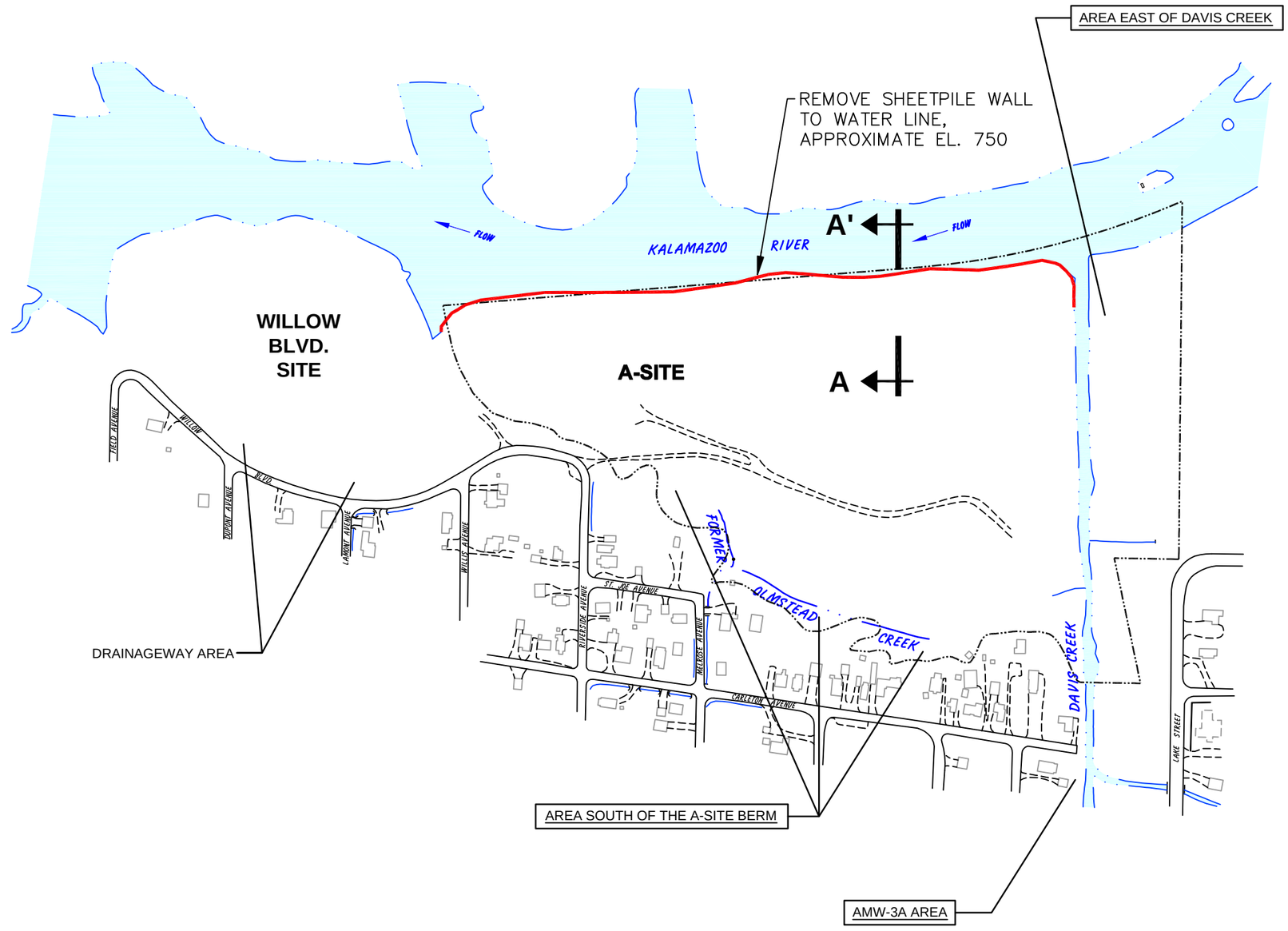
GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

WILLOW BOULEVARD/A-SITE AND ANCILLARY AREAS

ARCADIS

FIGURE
2



LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- APPROXIMATE A–SITE BOUNDARY
- SHEETPILE WALL

NOTES:

1. SLOPE DIRECTIONS APPROXIMATED USING TOPOGRAPHIC MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
2. ALL LOCATIONS ARE APPROXIMATE.
3. CROSS SECTION A–A' IS PRESENTED IN FIGURE 6.

0 300' 600'

GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

CONCEPTUAL PLAN WITH PARTIAL SHEETPILE REMOVAL

ARCADIS

FIGURE
3

CITY: SYRACUSE DIV/GROUP: 141/ENV DB: L.POSENAUER K.DAVIS B.PITTSLEY LD:(Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE LYR:(Opt)=*;OFF=*REF*
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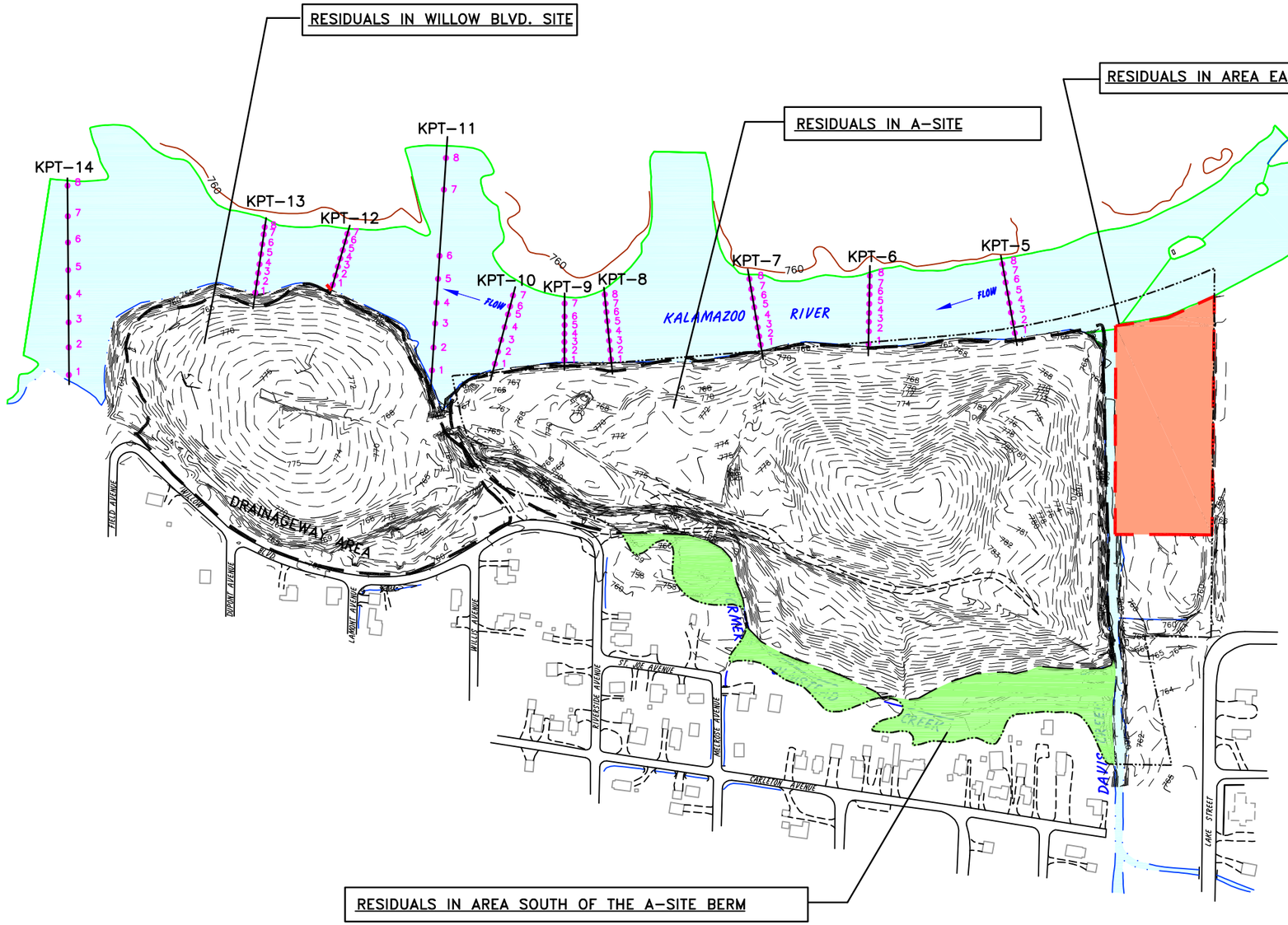

LEGEND:

- ELEVATION CONTOUR (NGVD 1929)
- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- APPROXIMATE A-SITE BOUNDARY
- KPT-5 SEDIMENT PROBING TRANSECT
- ASSUMED WILLOW BOULEVARD/ A-SITE OU BOUNDARY
- ASSUMED BOUNDARY FOR AREA EAST OF DAVIS CREEK VOLUME ESTIMATE
- AREA SOUTH OF THE A-SITE BERM

NOTES:

1. UNLESS OTHERWISE INDICATED ALL SAMPLE LOCATIONS SURVEYED BY WADE-TRIM INC. OCTOBER 1993 THROUGH AUGUST 1996. SAMPLES ARN-1 THROUGH ARN-5 AND WRN-1 THROUGH WRN-5 WERE SURVEYED BY BBL JULY 1993.
2. TOPOGRAPHIC MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
3. RESIDUALS VOLUME ESTIMATES ARE APPROXIMATE.
4. ALL LOCATIONS ARE APPROXIMATE.

0 300' 600'

GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

ANCILLARY AREAS EXTENT OF EXCAVATION

ARCADIS

FIGURE 4

CITY: SYRACUSE DIV/GROUP: 14/ENV DB: R.PETRIE P.LISTER B.PITTSLEY LD:(Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE
G:\ENV\CAD\SYRACUSE\ACT\B0064582\00000670\DWG\REPORT\RDWP\64582G04.DWG LAYOUT: 4SAVED: 11/5/2009 3:38 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: PLTFULL.CTBPLOTTED: 12/8/2009 11:49 AM BY: GETTS, BRIAN
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64582X00
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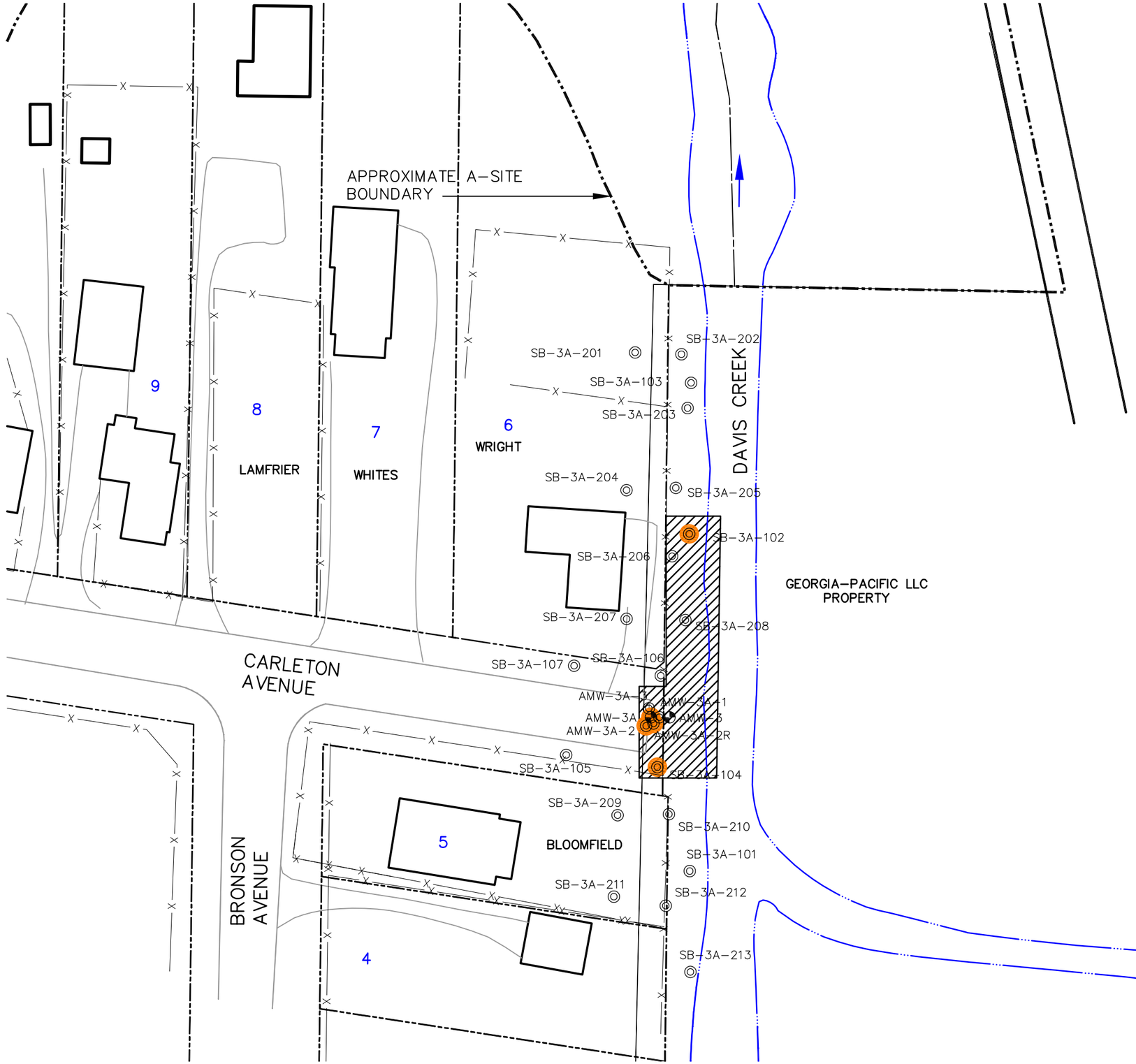

LEGEND:

- EXISTING FENCE LINE
- 6 PARCEL NUMBER
- EXISTING SOIL BORING
- EXISTING MONITORING WELL (1993)
- EXCEEDANCE OF DISTRICT CRITERION
- APPROXIMATE EXTENT OF PROPOSED EXCAVATION

NOTES:

1. BASE MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
2. SOIL BORINGS SB-3A-201 THROUGH SB-3A-213 SURVEYED BY WADE-TRIM INC. MAY 1999.
3. ALL PROPERTY LINES SHOWN WERE ADDED FROM A MAP BY ATWELL-HICKS, INC. ENTITLED TOPOGRAPHY SURVEY OF WILLOW BOULEVARD AREA, DATED MAY 6, 1999.
4. DATA REFLECT TOTAL PCB DERIVED FROM THE SUM OF INDIVIDUAL AROCLORS.
5. THE FENCE LINE ALONG DAVIS CREEK WAS RELOCATED TO THE LOCATION SHOWN IN 2000.
6. DATA COLLECTED FROM THE REMEDIAL INVESTIGATION/FOCUSED FEASIBILITY STUDY.
7. ALL LOCATIONS ARE APPROXIMATE.

0 40' 80'

GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

AMW-3A AREA EXTENT OF EXCAVATION

ARCADIS

FIGURE
5

CITY: SYRACUSE DIV/GROUP: 141/ENV DB: G.STOWELL P.LISTER B.PITTSLEY LD:(Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE LYR:(Opt)ON=*;OFF=*REF*
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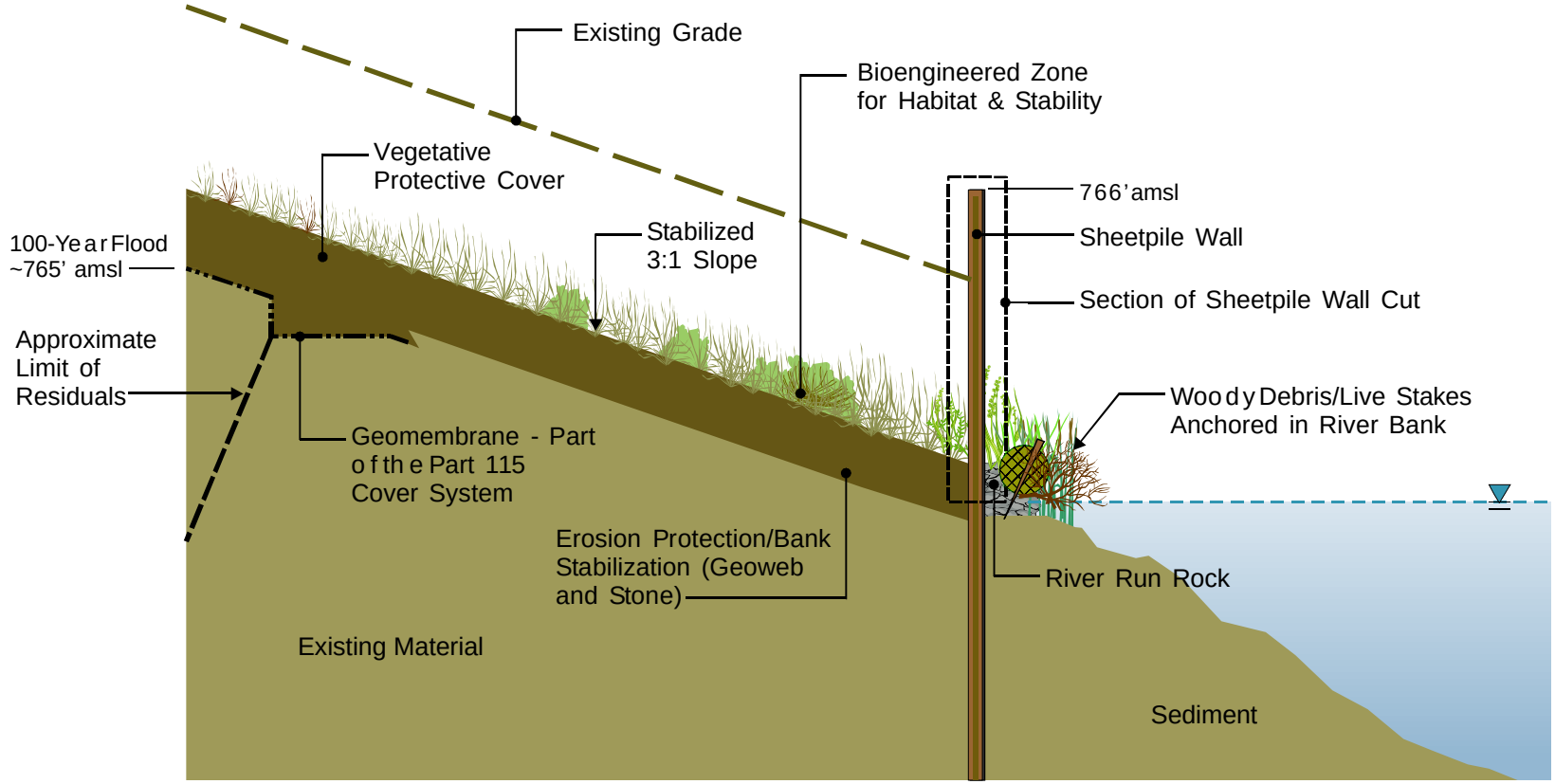


NOT-TO-SCALE

CROSS-SECTION A - A'

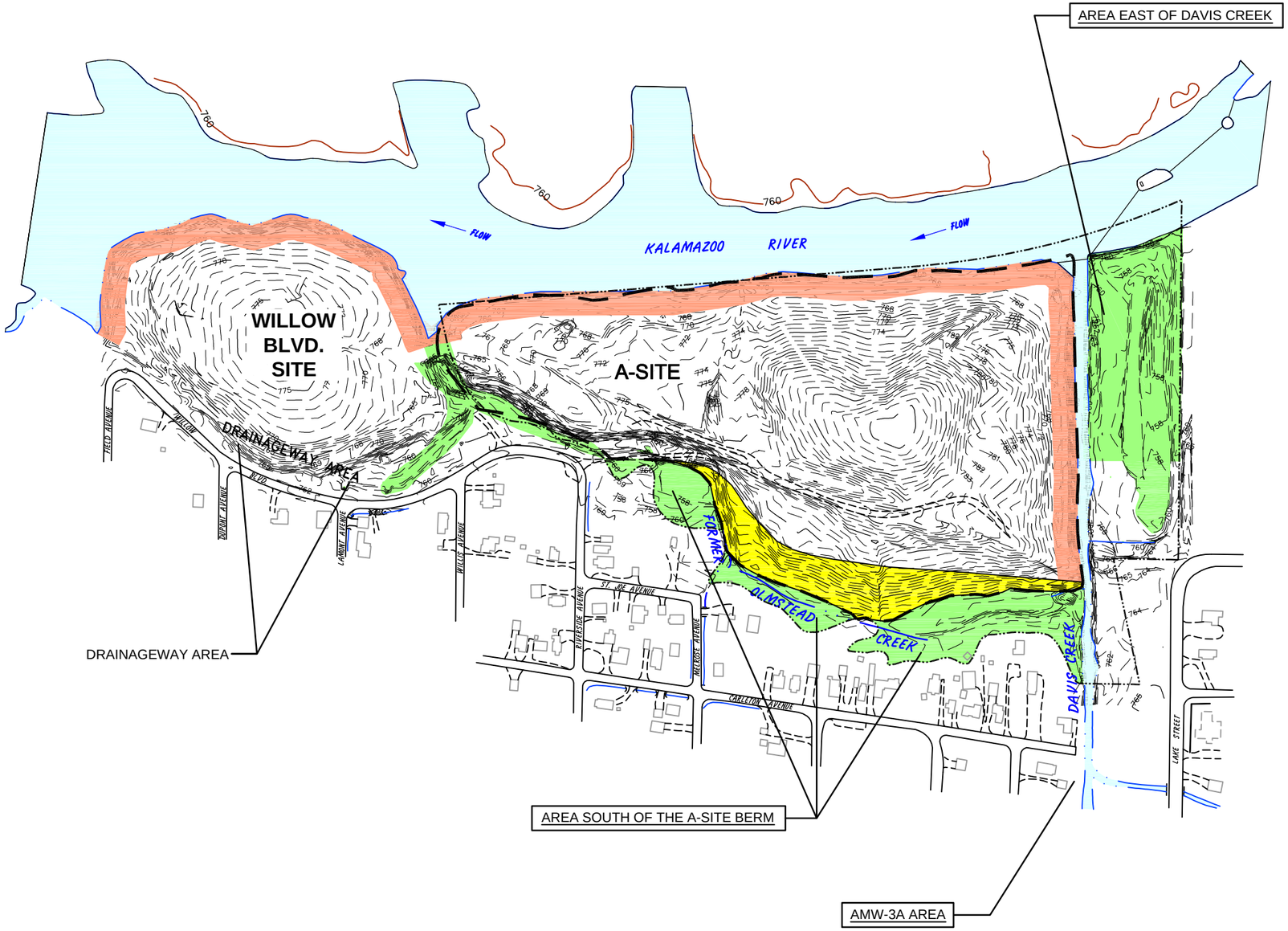
NOTE:
NATIVE HERBACEOUS WETLAND VEGETATION
WILL BE INSTALLED AS THE VEGETATIVE LAYER

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

CONCEPTUAL RIPARIAN CORRIDOR CROSS SECTION AT A-SITE – HABITAT MITIGATION PLAN

ARCADIS

FIGURE
6



LEGEND:

- ELEVATION CONTOUR (NGVD 1929)
- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- GEORGIA–PACIFIC LLC PROPERTY BOUNDARY OUTSIDE OF A–SITE
- APPROXIMATE A–SITE BOUNDARY
- RIPARIAN CORRIDOR
- AREAS TO BE ENHANCED AS EMERGENT WETLANDS
- AREAS TO BE ENHANCED AS RIPARIAN WOODLAND CORRIDOR

NOTES:

1. TOPOGRAPHIC MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
2. ALL LOCATIONS ARE APPROXIMATE.

0 300' 600'

GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

CONCEPTUAL HABITAT MITIGATION PLAN - RIPARIAN CORRIDOR AND WETLAND AREAS

ARCADIS

FIGURE 7

CITY: SYRACUSE DIV/GROUP: 141/ENV DB: L.POSENAUER K.DAVIS B.PITTSLEY LD: (Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE LYR:(Opt)ON=*;OFF=*REF*
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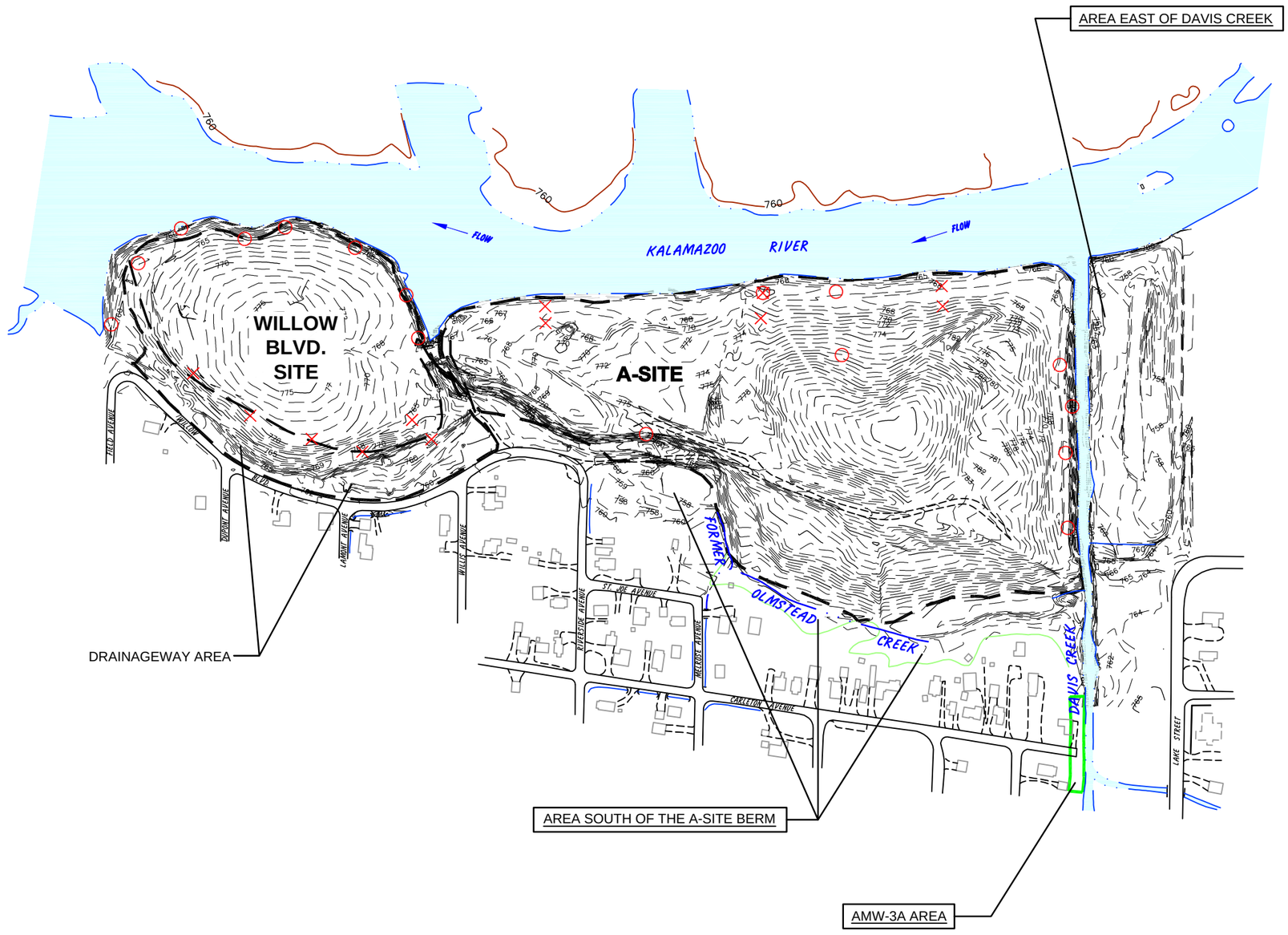
64582X00



LEGEND:

- ELEVATION CONTOUR (NGVD 1929)
- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- PRE-DESIGN GEOTECHNICAL BORING LOCATIONS
- PRE-DESIGN RESIDUALS CHARACTERIZATION BORING LOCATIONS
- COMBINED PRE-DESIGN GEOTECHNICAL AND RESIDUALS CHARACTERIZATION BORING LOCATIONS

NOTE:

1. TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, MAY 2007.
2. GEOTECHNICAL SOIL BORINGS WILL BE ADVANCED TO 30 FEET DEPTH USING A 4.25" HOLLOW STEM AUGER.
3. RESIDUALS CHARACTERIZATION BORINGS WILL BE ADVANCED TO 25 FEET DEPTH USING A GEOPROBE.
4. ONE RESIDUALS CHARACTERIZATION BORING LOCATION IS COMBINED WITH A GEOTECHNICAL BORING LOCATION. IN THIS LOCATION, BORING WILL BE ADVANCED TO 30 FEET DEPTH USING A 4.25' HOLLOW STEM AUGER.

0 300' 600'

GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

PRE-DESIGN INVESTIGATION BORING LOCATIONS

ARCADIS

FIGURE
8

CITY: SYRACUSE DIV/GROUP: 141/ENV DB: L.POSENAUER K.DAVIS B.PITTSLEY LD:(Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE LYR:(Off)=*REF*
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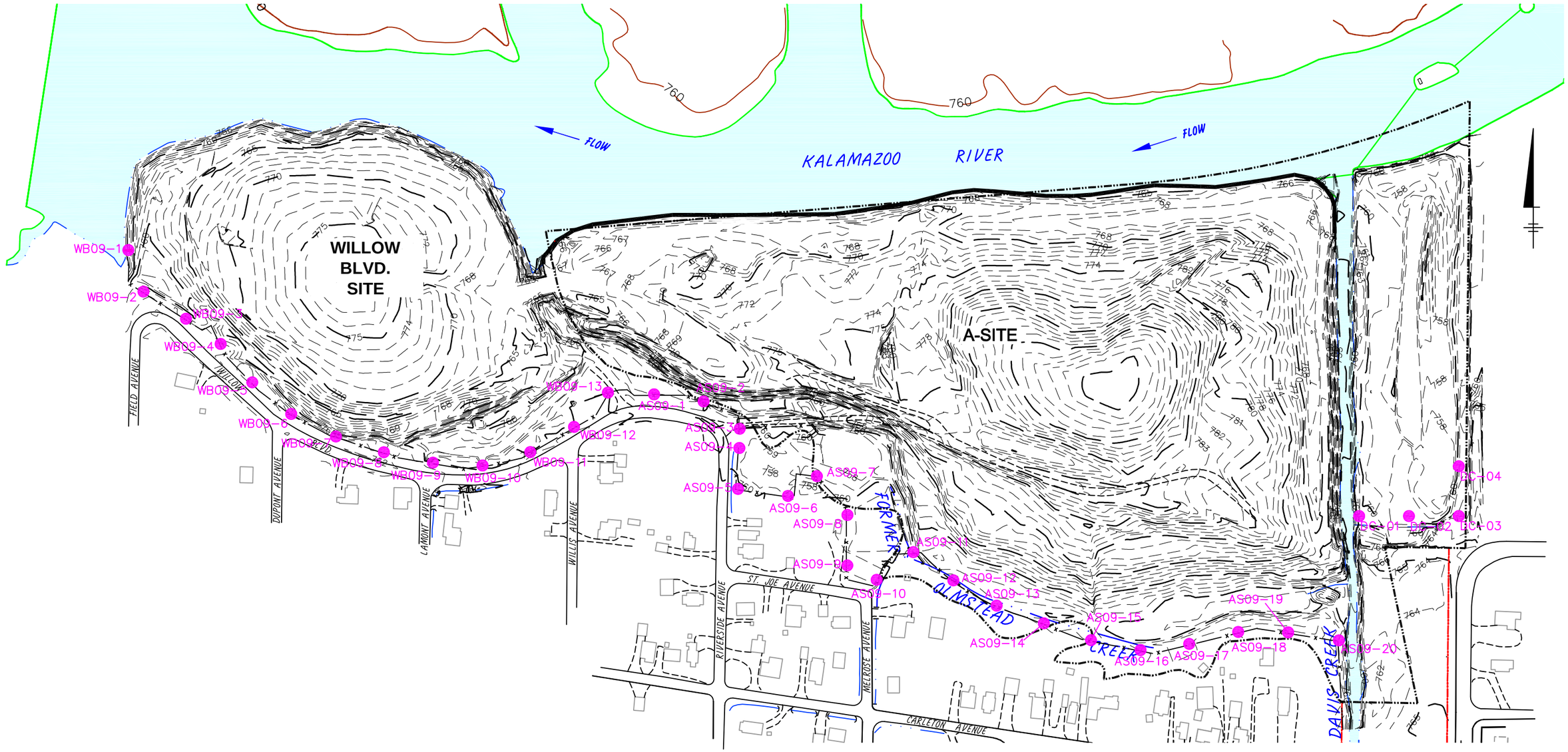

LEGEND:

- ELEVATION CONTOUR (NGVD 1929)
- EDGE OF WATER OR DRAINAGE CHANNEL
- UNPAVED ROAD/TRAIL
- APPROXIMATE A–SITE BOUNDARY
- GEORGIA–PACIFIC LLC PROPERTY BOUNDARY OUTSIDE OF A–SITE
- EXISTING SHEETPILE WALL
- EXISTING FENCELINE
- WB09–7 PROPOSED PCB SAMPLE LOCATION

NOTES:

1. BASE MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
2. TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, MAY 2007.
3. ALL LOCATIONS ARE APPROXIMATE.

0 200' 400'
GRAPHIC SCALE

GEORGIA-PACIFIC LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL DESIGN WORK PLAN
WILLOW BOULEVARD/A-SITE LANDFILL OU

PROPOSED PCB SAMPLE LOCATIONS

ARCADIS

FIGURE 9

CITY: SYRACUSE DIV/GROUP: 14/ENV DB: L.POSENAUER K:\DAVIS B.PITTSLEY LD:(Opt) PIC: B.DESHIELDS PM: P.MCGUIRE TM: P.MCGUIRE LYR:(On)ON=*;OFF=*REF*
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XREFS: 64582X02 64582X00 64582X01 IMAGES: PROJECTNAME: ---

ARCADIS

Appendix A

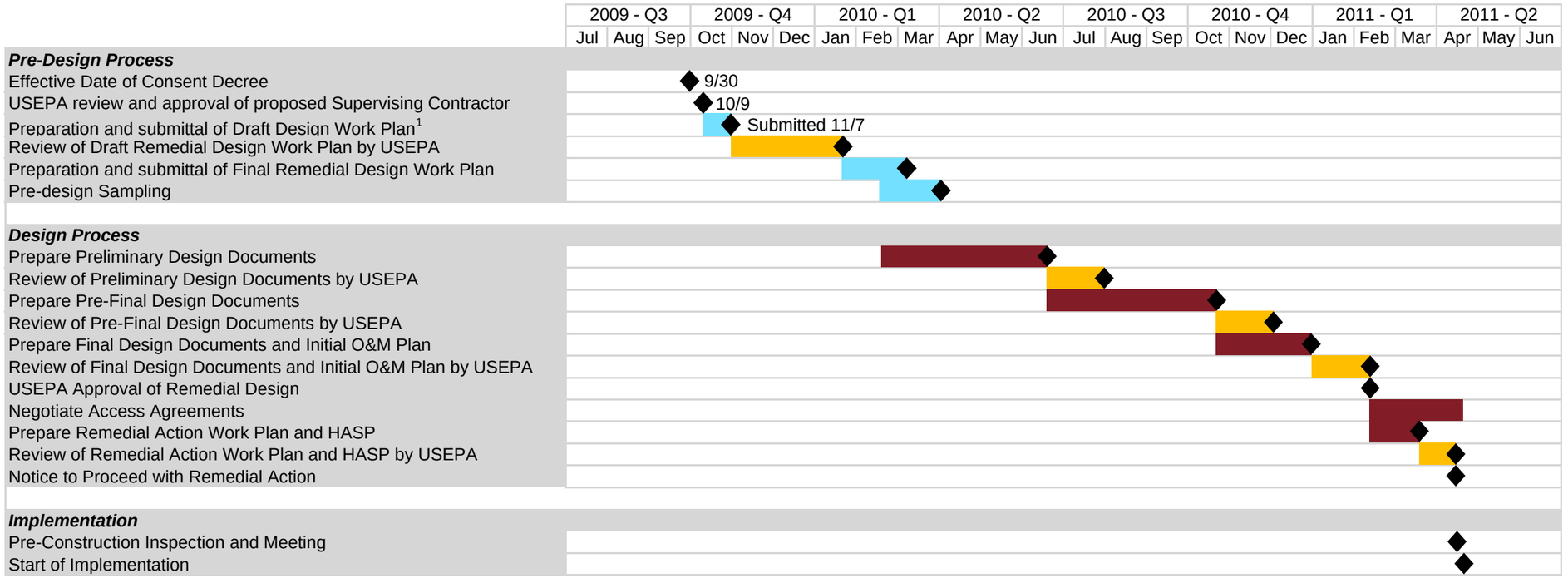
Willow Boulevard/A-Site Landfill OU
Overall Schedule

Georgia-Pacific LLC

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site Landfill Operable Unit 2 Remedial Design Work Plan

Summarized Remedial Design Schedule



Notes:

1. Submittal of Design Work Plan includes Health and Safety Plan, Field Sampling Plan, and Quality Assurance Project Plan
2. Implementation and O&M activities not included on this schedule
3. All USEPA review times are estimated

G:\COMMON\64581-A-site\04 Project Management\Schedule\OU2 RDRA Excel Schedule 03-04-10.xls
Created by: DA
3/4/2010